WD presented at Working Group for the Bay of Biscay and the Iberian waters Ecoregion (WGBIE)
ICES, Copenhagen, Denmark, 4–10 May 2015

Review of the Spanish commercial tuning indices used in the assessment of the southern stocks of hake and anglerfish, and FU25 of Norway lobster

J. Castro and R. Morlán

Instituto Español de Oceanografía (IEO): jose.castro@vi.ieo.es

ABSTRACT

The largest Spanish commercial tuning indices in Atlantic Iberian waters are based on the bottom otter trawl fleet that operates from the port of A Coruña (Galicia, Spain). They are used by ICES in the assessment of a variety of Iberian demersal stocks, such as hake, anglerfish, megrims and Norway lobsters. However, the adaptation of scientific data bases to the recent update of raw fisheries statistics has caused irregularities in the submission of these tuning indices in the last five years. This paper provides the A Coruña commercial tuning indices for the southern stocks of hake, white anglerfish and black anglerfish, as well as Functional Unit 25 (West Galicia) of Norway lobster for 2009-2014.

INTRODUCTION

Commercial tuning indices are a common tool used for assessing marine resources and extend the information provided by scientific survey indices. Surveys are sometimes unaffordable, mainly due to economic reasons and when they are carried out, they are mainly designed to evaluate the recruitment with little access to adult individuals exploited by the fisheries. Of all the commercial tuning fleets in the North-western Spanish waters, the A Coruña bottom otter trawl (OTB) fleet is the one that provides the best indices for tuning demersal stocks (Table 1). Firstly, the time series is the largest among all of the North-western Spanish ports, as it dates back to 1982. Secondly, the commercial importance of A Coruña port on fresh landings of demersal fish makes its information less dependent on strategic changes as those observed in other ports. The LPUE indices of this fleet have been traditionally used to calibrate the assessment of the main WGBIE Iberian stocks (Table 1): hake (*Merluccius merluccius*), black anglerfish (*Lophius budegassa*), white anglerfish (*L. piscatorius*), four-spot megrim (*Lepidorhombus boscii*), megrim (*L. whiffiagonis*), and Functional Unit 25 (North Galicia) of Norway lobster (*Nephrops norvegicus*).

Ever since implementation of the current DCF sampling programme (EC, 2008), the North-western Spanish OTB fleet is split into two different *métiers* (Punzón *et al*., 2010): trips targeting demersal fish (OB_DEF_>=55_0_0) and trips targeting pelagic fish accompanied by demersal fish (OTB_MPD_>55_0_0). These two *métiers* were split backwards (until 1986) and the respective LPUE time series were estimated for megrim and four-spot megrim, and provided to the WKSOUTH 2014 benchmark (Castro *et al*., 2014; ICES, 2014a), where they were accepted to tune their respective stock assessments (ICES, 2014b).

However, the original unsplit commercial tuning fleet (acronym SP-CORUTR8c) is still used in the assessment of the southern stocks of hake, white anglerfish, and black anglerfish. Unfortunately, the irregular quality of the indices provided in recent years has caused their rejection in the final assessment of these stocks.

Regarding crustaceans, the A Coruña OTB series is also used in the assessment of Functional Unit 25 of Norway lobster (North Galicia). In the past, the original commercial tuning index was obtained from the entire A Coruña trawl fleet. Although it is still presented as such in the report (ICES, 2014), it was actually split into *métiers* ten years ago, with a view to using only the demersal component to calibrate assessment (ICES, 2004). Naturally, this differentiation in *métiers* preceded the current DCF implementation, with the drawback that the clustering approach has not been described properly in the corresponding ICES reports.

The aim of this working document is to provide suitable commercial indices from the last five years for the southern stocks of hake, white anglerfish, black anglerfish, and FU25 of Norway lobster. Therefore, scientific and commercial fishing data have been analyzed and revised for the period 2009-2014.

MATERIAL AND METHODS

The dataset analysed was compiled from IEO sampling data and official logbooks from 2009-2014. The sampling data of the A Coruña OTB fleet is comprised of biological sampling of trips landed at port, recording of landings by species and their respective length frequency distributions (LFD). The sampling level for the period varied from 1.7% in 2009 to 2.6% in 2014 (Table 2).

The official logbooks of the Northern Spanish coastal OTB fleet for the period 2009–2014 were provided by the Spanish Ministry responsible for fisheries (MAGRAMA). This dataset contains landings by species and information on effort by vessel, fishing day, landing port, and ICES rectangle.

RESULTS

Landings, effort and the resulting LPUE indices of the A Coruña OTB fleet are shown in Table 3 for hake, white anglerfish and black anglerfish. A comparison of the new series with the old one submitted previously to the WGBIE (ICES, 2013) shows that effort only matches in 2009, and seems to be underestimated for the rest of the years in the old series. The effort value provided last year to the WGBIE (CES, 2014) was revised downwards because the transition between paper-based to electronic logbooks caused an overestimation of the 2013 effort. In terms of landings, it was the 2012 value of hake which underwent a major change, and therefore was also revised upwards (Figure 1).

The landings of both anglerfishes were also reviewed for years 2010-2013. Within the review period, black anglerfish shows its highest LPUE index in 2012, while white anglerfish does so in 2009. However none of these indices provide the highest values of their respective series, unlike that seen in hake.

In the case of Norway lobster FU25, the values of effort were revised downwards for the period 2009-2011 but upwards in 2012. Unlike the commercial fleet used in the assessment of hake and monkfish, the assessment of Norway lobster FU25 is developed by using only the

demersal *métier* of this fleet (OTB_DEF_>=55_0_0). Although the DCF *métier*-based biological sampling was implemented in the Spanish sampling programme since 2009, its preliminary implementation at the beginning requires that it be presented here. The LPUE indices obtained for Norway lobster provide the highest value in 2011.

DISCUSSION

The old LPUE series of southern hake showed an increasing trend since 2004, and peaked in 2011, followed by a slight decrease in 2012 (ICES, 2013). Last year, the WGBIE considered the Spanish LPUE estimate for 2013 as unreliable because of changes in the effort estimation procedure. Therefore, a review of the time series was required backwards (ICES, 2014). The data provided here completes the time series, confirming the increasing trend for the period starting in 2004. However, the highest value is now observed in 2012, followed by lower indices in 2013 and 2014. Despite the sharp decline in the last two years, the 2014 LPUE index shows a value that is similar to the highest value of the time series observed before 2004.

This commercial index is the main source of information for large individuals on the hake assessment and influences the quality of the assessed. Therefore, the compilation of the A Coruña tuning fleet (SP-CORUTR8c) should be maintained in the future. Other hake LPUE series, which were provided in the past, have never been included in the model (SP-CORUTRP, SP-VIMATR, SP-SANTTR). As some of these ports presented some logistic problems, the respective LPUE compilation was abandoned in 2012.

The white and black anglerfishes LPUE series are larger than the hake LPUE series because they were extended backwards to incorporate years 1982-1985 (ICES, 2013). For these stocks, three series are presented for the A Coruña fleet: "*A Coruña port*" for trips that are exclusively landed in the port, "*A Coruña trucks*" for trips that are landed in other ports and "*A Coruña fleet*" that takes into account all the trips of the fleet. The review presented here only considers the first series, because it is the LPUE series used to assess these stocks. Moreover, the landings transported to port by truck can derive from partial trips, which do not represent the landing profile of the fishing strategy.

For Norway lobster FU25, an attempt has been made to fit the old criteria of fleet segmentation (ICES 2004) with the new methodology implemented since DCF 2008. The old segmentation was specifically made for this stock, and unfortunately there is no detailed information in the ICES reports regarding criteria and methodology. Since 2009, the *métier* identification of the Spanish otter trawlers in the Cantabrian Sea (ICES Division VIIIc) is carried out by using multivariate cluster technique CLARA (clustering large applications; Kaufman and Rousseeuw, 1990). Differences between both time series may affect analytical assessment however, Norway lobster FU25 is catalogued as an ICES data-limited stock of category 3.1.4 (ICES, 2012) and is assessed by the LPUE series trend.

References

Castro, J., E. Abad, M. Marín, R. Morlán and A. Punzón. 2014. Standardization of the LPUE series of the Northern Spanish coastal bottom otter trawl fleet to tune the assessment of the Iberian megrims stocks. WD presented at Benchmark Workshop on Southern Megrim and Hake (WKSOUTH). ICES, Copenhagen, Denmark, 3–7 February 2014. Pag 12.

EC. 2008. COUNCIL REGULATION (EC) No 199/2008 of 25 February 2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy. 5.3.2008. L 60/1-12.

ICES. 2004. Report of the Working Group on Nephrops Stocks28–01 April 2004, Lisbon, Portugal. ICES CM 2004/ACFM:19. Pag 441.

ICES. 2013. Report of the Working Group on the Assessment of Southern Shelf Stocks of Hake, Monk and Megrim (WGHMM), 10 - 16 May 2013, ICES Headquarters, Copenhagen. ICES CM 2013/ACOM:11A. 719 pp.

ICES. 2014a. Report of the Benchmark Workshop on Southern megrim and hake (WKSOUTH), 3-7 February 2014, ICES HQ, Copenhagen, Denmark. ICES CM 2014/ACOM:40. 236 pp.

ICES. 2014b. Report of the Working Group for the Bay of Biscay and the Iberian waters Ecoregion (WGBIE), 7–13 May 2014, Lisbon, Portugal. ICES CM 2014/ACOM:11. 748 pp.

Kaufman, L. and Rousseeuw, P.J., 1990. Finding Groups in Data: An Introduction to Cluster Analysis. John Wiley & Sons, Inc., New York.

Punzón, A., Hernández, C., Abad, E., Castro, J., Pérez, N., and Trujillo, V. 2010. Spanish otter trawl fisheries in the Cantabrian Sea. ICES Journal of Marine Science 67: 1604–1616.

Table 1. A Coruña commercial tuning series currently used in WGBIE assessments (ICES, 2014). SP-CORUTR8c: A Coruña bottom otter trawl fleet; SP-LCGOTBDEF: demersal DCF *métier* (OTB_DEF>=55_0_0) of the A Coruña bottom otter trawl fleet.

Acronym	Stock	Tuning fleet	Time series
anb-8c9a	Black-bellied anglerfish (*Lophius budegassa*) in Divisions VIIIc and IXa	SP-CORUTR8c	1982-to date
anp-8c9a	White anglerfish (*Lophius piscatorius*) in Divisions VIIIc and IXa	SP-CORUTR8c	1982- to date
hke-soth	Hake (*Merluccius merluccius*) Southern stock)in Divisions VIIIc and IXa	SP-CORUTR8c	1985- to date
mgb-8c9a	Four-spot megrim (*Lepidorhombus boscii*) in Divisions VIIIc and IXa	SP-LCGOTBDEF	1986–1999 2000- to date
mgw-8c9a	Megrim (*Lepidorhombus whiffiagonis*) in Divisions VIIIc and IXa	SP-LCGOTBDEF	1986–to date
nep-25	Nephrops (*N. norvegicus*) in North Galicia (FU 25)	SP-LCGOTBDEF	1986-to date

Table 2. Sampling level on the A Coruña bottom otter trawl fleet during the time period analyzed.

Year	Nº of sampled trips	Total trips	Sampling level (%)
2009	55	3176	1.7
2010	44	3067	1.4
2011	59	2312	2.6
2012	61	2381	2.6
2013	55	2260	2.4
2014	71	2708	2.6

Table 3. Time series of landings (t), effort (fishing days x100 HP) and LPUE (kg/fdx100 HP) of the A Coruña bottom otter trawl fleet (SP-CORUTR8c) for southern stocks of hake (HKE), black anglerfish (ANK) and white anglerfish (MON).

YEAR	HKE Landings	ANK Landings	MON Landings	SP-CORUTR8c effort	HKE LPUE	ANK LPUE	MON LPUE
1982	---	655	1618	63313	---	10.3	25.6
1983	---	765	1490	51008	---	15.0	29.2
1984	---	574	1560	48665	---	11.8	32.1
1985	945	253	1134	45920	20.6	5.5	24.7
1986	842	352	825	39810	21.2	8.8	20.7
1987	695	673	618	34680	20.0	19.4	17.8
1988	698	570	656	42180	16.5	13.5	15.6
1989	715	344	508	44440	16.1	7.7	11.4
1990	749	288	550	44430	16.9	6.5	12.4
1991	501	225	491	40440	12.4	5.6	12.1
1992	589	211	432	38910	15.1	5.4	11.1
1993	514	199	385	44504	11.5	4.5	8.7
1994	473	166	245	39589	11.9	4.2	6.2
1995	831	353	260	41452	20.0	8.5	6.3
1996	722	334	413	35728	20.2	9.3	11.6
1997	732	298	411	35211	20.8	8.5	11.7
1998	895	323	138	32563	27.5	9.9	4.2
1999	691	374	168	30232	22.9	12.4	5.6
2000	590	287	85	30102	19.6	9.5	2.8
2001	597	281	84	29923	20.0	9.4	2.8
2002	232	76	130	21823	10.6	3.5	6.0
2003	274	85	228	18493	14.8	4.6	12.3
2004	259	68	277	21112	12.3	3.2	13.1
2005	330	54	391	20663	16.0	2.6	18.9
2006	518	70	242	19264	26.9	3.6	12.6
2007	621	109	222	21201	29.3	5.1	10.5
2008	762	163	274	20212	37.7	8.1	13.6
2009	640	80	165	16152	39.6	5.0	10.2
2010	553	73	129	16680	33.2	4.4	7.7
2011	557	64	92	12835	43.4	5.0	7.2
2012	681	101	132	14446	47.1	7.0	9.1
2013	542	88	122	14736	36.8	6.0	8.3
2014	493	79	114	18060	27.3	4.4	6.3

Table 4. Time series of landings (t), effort (trips) and LPUE (kg/trip) of the demersal *métier* (OTB_DEF>=55_0_0) of the A Coruña bottom otter trawl fleet (SP-LCGOTBDEF) for Functional Unit 25 (West Galicia) of Norway lobster.

	Demersal *métier* A Coruña trawl		
YEAR	**NEP25 Landings**	**Effort**	**LPUE**
1986	302	5017	60.2
1987	356	4266	83.5
1988	371	5246	70.7
1989	297	5753	51.6
1990	199	5710	34.9
1991	334	5135	65.0
1992	351	5127	68.5
1993	229	5829	39.3
1994	207	5216	39.7
1995	233	5538	42.1
1996	182	4911	37.1
1997	187	4850	38.6
1998	67	4560	14.7
1999	121	4023	30.1
2000	77	3547	21.7
2001	145	3239	44.8
2002	115	2333	49.3
2003	65	1804	36.0
2004	40	2091	19.1
2005	32	2063	15.5
2006	33	1699	19.4
2007	37	2075	17.8
2008	21	2128	9.9
2009	11	1355	8.3
2010	22	1164	18.6
2011	35	906	38.4
2012	10	1460	6.8
2013	8	1582	5.3
2014	8	1869	4.5

Figure 1. LPUE (kg/fdx100 HP) of the A Coruña bottom otter trawl fleet (SP-CORUTR8c) for southern stocks of hake (HKE), black anglerfish (ANK) and white anglerfish (MON).

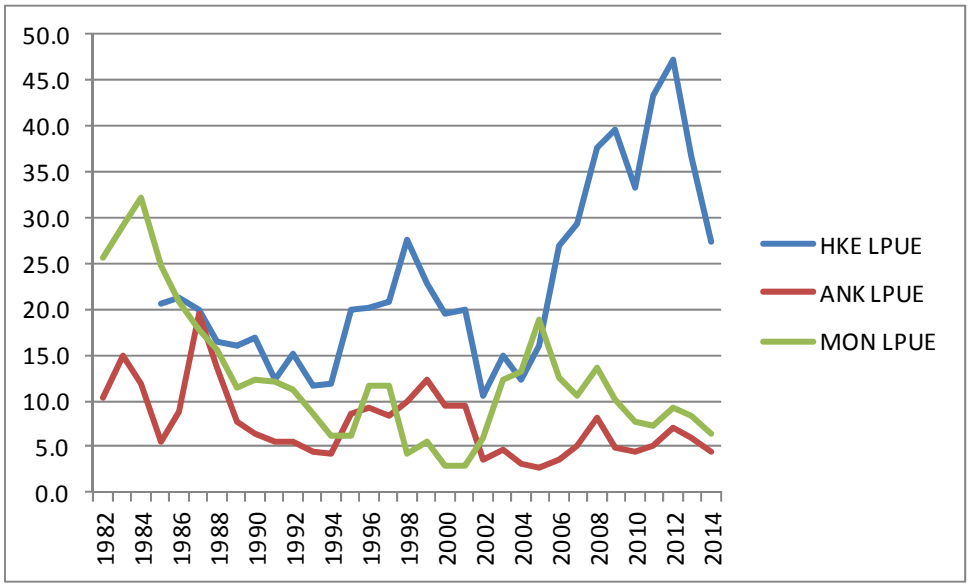

Figure 2. LPUE (kg/trip) of the demersal *métier* (OTB_DEF>=55_0_0) of the A Coruña bottom otter trawl fleet (SP-LCGOTBDEF) for Functional Unit 25 (West Galicia) of Norway lobster.